

REMARKS

Claims 14, 16-20, 22-31 are pending in the application; claim 31 has been added with the instant amendment.

Rejection under 35 U.S.C. 103

Claims 14, 16-18, 22-30 stand rejected under 35 U.S.C. 103 (a) as being unpatentable over *Fukaya et al.* (US 5,775,740) in view of *Ficker et al.* (DE 19526900).

Claims 19-20 stand rejected under 35 U.S.C. 103 (a) as being unpatentable over *Fukaya et al.* (US 5,775,740) in view of *Ficker et al.* (DE 19526900) and further in view of *Yamaguchi et al.* (US 6,629,547).

In regard to claim 14, examiner argues that *Fukaya* discloses a cold rolling method for producing an annular composite workpiece with axial roll forming performed by pressing between outer roll forming tool 8 and inner rolling arbor (examiner refers to Fig. 16B; col. 5, lines 27-26; and col. 6, lines 1-16). Examiner further states that two opposed outer roll forming tools are known from *Ficker* as shown in Fig. 2. Therefore, it would have been obvious to combine the teachings of two opposed outer roll forming tools of *Ficker* to more efficiently produce the composite annular workpiece by the method of *Fukaya*.

Examiner has set forth in the advisory action that the instant claims contain no feature in regard to the shape/structure and movement or rotation and no feature in regard to the force magnitude.

Claim 14 has been amended to better define the axial roll forming step by specifying that the outer tools and the inner arbor or roll forming tool are rotating. It is further now claimed that the outer roll forming tools are profiled to produce an outer profile on the composite workpiece, wherein the outer roll forming tools, as shown in Figs. 2 and 6 (black arrows) and also in Figs. 9 and 10 and as set forth in the paragraph bridging pages 5 and 6 of the specification, are radially advanced and apply radial pressure in radial inward direction. The pressure is sufficient to effect a cold pressure

weld.

The present invention concerns producing a composite workpiece made of different steels or non-iron metals that are connected by an intimate connection (cold pressure weld) to each other for producing in particular roller bearings and gears with high precision. Thick-walled tubular material is the starting material. In Figs. 2, 4, 6 of the instant application, the action of the profiled rolling tools 6 applying radial forces onto the workpieces can be seen especially well. The outer tools are profiled and produce a profiled outer contour of the composite workpiece. The high forces in radial direction causes the two workpieces of the starting materials to become inseparably connected by cold pressure welding.

Claim 14 has been amended to set forth a pressure sufficient to effect a cold pressure weld. For example, in order to produce a gear ring of approximately 125 mm outer diameter and 100 mm inner diameter in accordance with the present invention, a pressure of 250 kN is required. The pressure to be applied depends on the material and also on the size and shape of the workpieces.

The reference *Fukaya* only teaches that material is forced into precut grooves by applying individually a pressing tool 8 at each of the precut grooves ("... subjected to a plastic flow to form the comb-tooth faces..."); *Fukaya* teaches an interlocked structure where the projections introduced into the recesses provide a locking action ("comb-tooth" structure) but *Fukaya* discloses no pressure that is sufficient to effect a cold pressure weld and discloses no cold weld connection produced by sufficiently high pressure. The disclosed connection is effected by interlocking of structural elements caused simply by plastic flow into pre-cut grooves.

Cold pressure welding requires pressures that surpass those required for a simple plastic deformation. If examiner continues to argue that it is obvious that a cold pressure weld connection is produced between the first and second hollow cylindrical workpieces of *Fukaya*, then applicant respectfully requests that examiner provide a printed publication or documentation in support of his position that plastic deformation or plastic flow will cause such a cold pressure weld.

As regards claims 19 and 20, it is respectfully submitted that *Yamaguchi* applied by examiner against the features of claims 19 and 20 discloses "adhesion layer" between plastic materials. This adhesion layer according to col. 7, lines 50ff, is an elastomer. The present invention claims in claim 19 and 20 an **aluminum layer**; an elastomer as disclosed in *Yamaguchi* cannot suggest or teach an aluminum layer.

Reconsideration and withdrawal of the rejection of the claims 14, 16-20 and 22-30 under 35 USC 103 are respectfully requested.

New claim 31 has been added. Claim 31 is directed to a cold-rolling method comprising axial roll forming a composite workpiece of first and second hollow cylindrical workpieces by pressing the first and second hollow cylindrical workpieces against each other between two diametrically opposed outer roll forming tools and an inner roll forming tool. The inner roll forming tool is profiled to produce an inner profile on the composite workpiece. The inner roll forming tool is radially advanced and applies radial pressure in outward radial direction and the two diametrically opposed outer roll forming tools are radially advanced and apply radial pressure in inward radial direction and press surfaces of the first and second hollow cylindrical workpieces that touch each other together at a pressure sufficient to effect a cold pressure weld of the first and second hollow cylindrical workpieces.

Instant Fig. 6 shows the inner roll forming tool 12 and the outer roll forming tools 6 applying pressure in radial direction onto the workpieces (see black arrows pointing inwardly and outwardly). Fig. 6 also shows the profiling of the inner tool that is imparted onto the inner surface of the composite workpiece that being roll-formed.

Such a method is not disclosed in *Fukaya*. *Fukaya* discloses a "mandrel" only by representation of a dashed line in Fig. 16B; no profiling of the mandrel is disclosed. There is also no disclosure that the mandrel is rotated or that it applies radial pressure in radial outward direction. There is also no disclosure that a pressure is applied that is sufficient to effect a cold pressure weld.

Claim 31 is therefore neither anticipated nor obvious in view of *Fukaya* or the combination of *Fukaya* with *Ficker*.

CONCLUSION

In view of the foregoing, it is submitted that this application is now in condition for allowance and such allowance is respectfully solicited.

Should the Examiner have any further objections or suggestions, the undersigned would appreciate a phone call or **e-mail** from the examiner to discuss appropriate amendments to place the application into condition for allowance.

Authorization is herewith given to charge any fees or any shortages in any fees required during prosecution of this application and not paid by other means to Patent and Trademark Office deposit account 50-1199.

Respectfully submitted on Oktober 10, 2011,

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